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SITE INSPECTION PRIORITIZATION LEVEL II

STAUFFER CHEMICAL COMPANY

WARREN COUNTY, VIRGINIA

EPA ID NUMBER VAD980551634
VA No. 273

US EPA, Region III
Reviewed and Approved

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1.0 INTRODUCTION

1.1 Authority

This report results from a Level II Site Inspection Prioritization investigation of the Stauffer Chemical Company site -- EPA ID Number VAD980551634, VA No. 273 -- located in Bentonville, Virginia (the "Site"). This investigation was performed by the Superfund Site Assessment Section of the Virginia Department of Environmental Quality in accordance with a contract agreement between the U.S. Environmental Protection Agency and under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and the Superfund Amendments and Reauthorization Act of 1986. The ultimate goal of site assessment investigations is to gather the information necessary and sufficient to make appropriate, defensible decisions regarding the placement of sites on the National Priorities List ("NPL"); sites on the NPL become eligible for cleanup under Superfund Law.

1.2 Scope of Work

Site Inspection Prioritization investigations review, potentially augment, and summarize site data which has been gathered under previous site investigations. Objectives are to identify hazardous substances at the site and evaluate whether they have been released to the environment or have impacted human health and the environment via appropriate ranking procedures. Level II investigations involve a review and summary of analytical data which may exist from previous site inspection reports and may include the limited collection of additional information as is necessary to accomplish report objectives. Site visits to collect additional sampling data are generally outside of the limited scope of work.

1.3 Summary

Based on available information, referenced and summarized in this report, it appears that the Site may adversely affect its surroundings as it appears that certain hazardous substances found in waste/source areas on-site:

1. Have the potential to be released into and affect the groundwater beneath the Site,

2. Are found in the surface waters leaving the Site at Level II contamination concentrations, in both Flint Run and the unnamed tributary leading to it and in the marshy area southwest of the Site, and have a limited potential to affect targets downstream in both cases,

3. Are found in surrounding soils at Level II contamination concentrations and have the potential for contact exposure, and

4. Have a limited potential to migrate through the air.

It should be noted that the analytical sampling results forming the basis of this report are relatively old, and in some cases, background data appears lacking or otherwise may be questionable. Some additional sampling data may be necessary to verify releases and confirm release attribution to the Site.

2.0 SITE DESCRIPTION

2.1 Location, Demographics, Climate and Meteorology

The Site is located off Routes 340 and 613 in Bentonville, Warren County, Virginia, as shown on Figure 1. Geographic coordinates of its approximate center are Latitude: 38° 49′ 58″ North, Longitude: 78° 18′ 47″ West. (Reference 1). The NPL Characteristics Data Collection Form is given in Appendix A.

Table I. Site-Centered Population Distribution.

Distance	Population	
	Ring	Σ
0 - ¼ miles	151	151
¼ - ½ miles	73	224
½ - 1 miles	243	467
1 - 2 miles	244	711
2 - 3 miles	355	1066
3 - 4 miles	478	1544

Figure 2 illustrates the population density around the Site, which is situated near the center of Bentonville. Table I gives the population within concentric rings centered on the Site. This population distribution is based on demographic and geographic data files from the 1990 U.S. Census Bureau. The population estimates for the two inner rings were improved by multiplying each residence by the average number of persons per residence in Warren County based on 1990 U.S. Census Bureau data. (Appendix D).

Climatological data for the immediate vicinity of the site was not found. The annual normal temperature for Virginia's northern division -- an area of the state in which the site is located which exhibits similar climatological characteristics -- is 54.2°F. January has the lowest monthly normal temperature of 32.0°F, and July has the highest, 74.9°F. Annual normal precipitation for the area is 40.54 inches, with maximum and minimum monthly normal contributions of 4.17 inches in August and 2.50 inches in February, respectively. (Reference 2). Net precipitation for the area is 16.30 inches. Table II illustrates the methodology used to evaluate this parameter. In the vicinity of the Site, about 3.5 inches of precipitation will fall during a

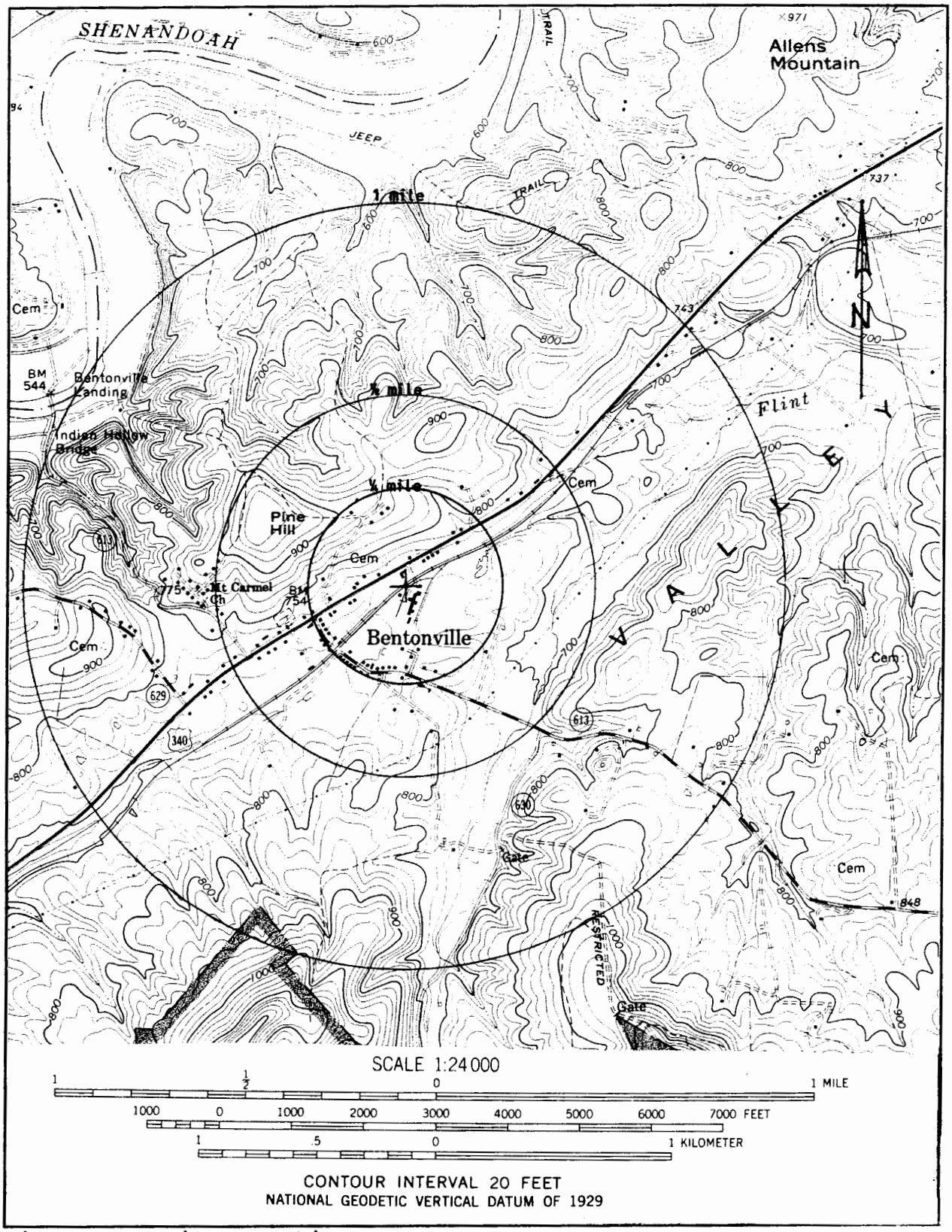
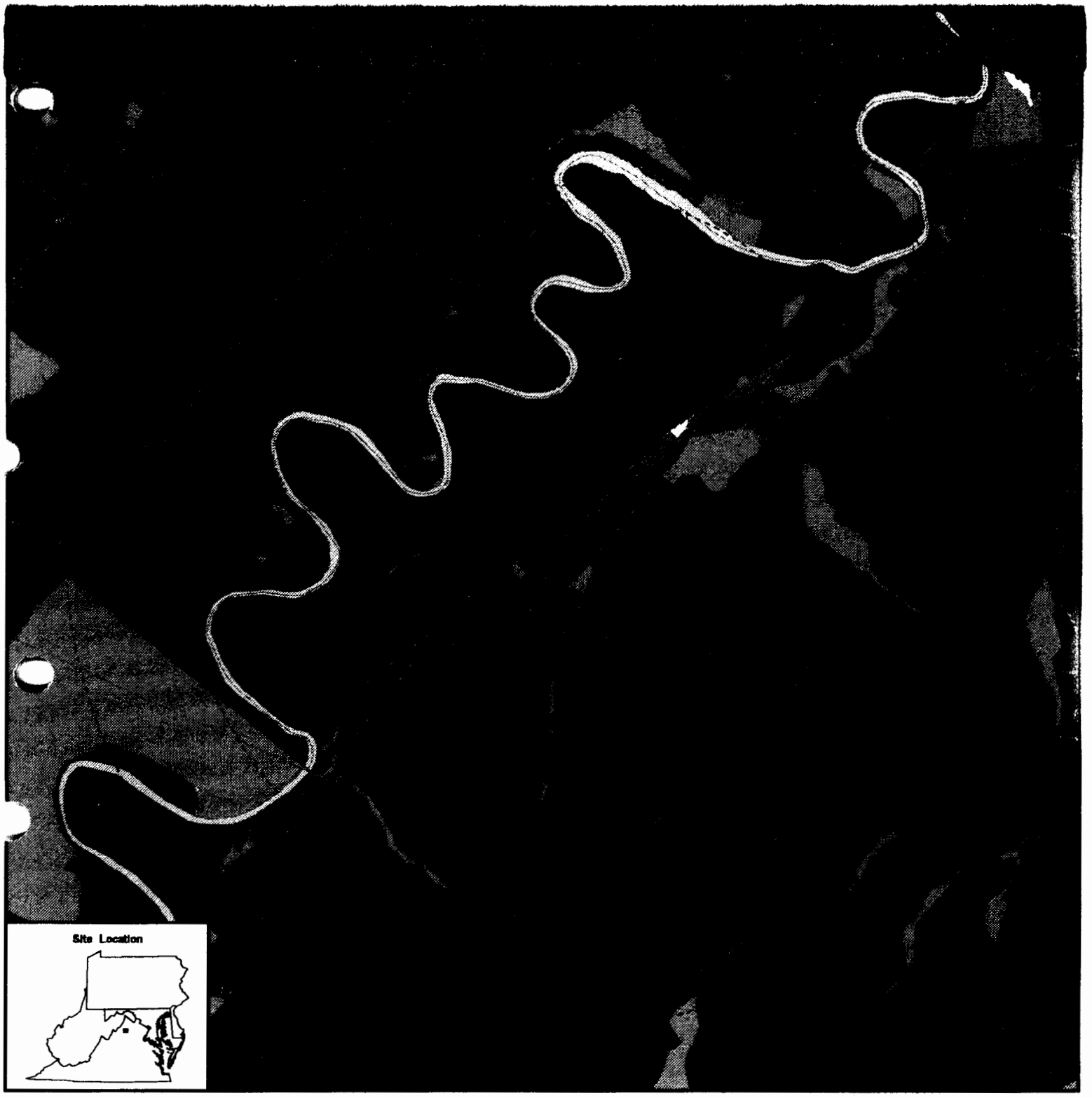


Figure 1. Site Location.



Population Density
Around Stauffer Chemical Co

Figure 2.

0 0.25 0.5 0.75 1 1.25 1.5 1.75 2

MILES

Scale 1 : 70866

Pop. Per Square KM

- > 7,500
- 5,000 - 7,499
- 2,500 - 4,999
- 1,000 - 2,500
- 500 - 1,000
- 100 - 499
- < 100

Non-Residential

Water

NORTH

Demographic Data from 1990 U.S. Census Bureau STF-3A and PL94-171 data files. Census Geography from 1990 U.S. Census Bureau TIGER data files.

Table II. Computation of Net Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation [in]	2.82	2.50	3.46	3.21	3.73	3.89	3.80	4.17	3.50	3.36	3.10	3.00
Temperature [°F]	32.0	34.5	43.1	54.1	62.9	70.7	74.9	73.8	67.4	55.8	45.5	35.8
Ti [°C]	0.00	1.39	6.17	12.28	17.17	21.50	23.83	23.22	19.67	13.22	7.50	2.11
(Ti/5) ^ 1.514	0.00	0.14	1.37	3.90	6.47	9.10	10.64	10.23	7.95	4.36	1.85	0.27
Lat adj val for 40.00°N	0.84	0.83	1.03	1.11	1.24	1.25	1.27	1.18	1.04	0.96	0.83	0.81
Lat adj val for 38.83°N	0.85	0.83	1.03	1.11	1.23	1.24	1.26	1.18	1.04	0.96	0.84	0.82
Lat adj val for 35.00°N	0.87	0.85	1.03	1.09	1.21	1.21	1.23	1.16	1.03	0.97	0.89	0.85
Pot. evapo–transpiration	0.00	0.07	0.70	1.94	3.43	4.71	5.51	4.96	3.48	1.87	0.75	0.13
Net monthly precipitation	2.82	2.43	2.76	1.27	0.30	0.00	0.00	0.00	0.02	1.49	2.35	2.87

Notes: I=56.28, a = 1.38, methodology per 12/14/90 FR, p. 5159(NET PRECIPITATION = 16.30

24-hour storm which has a return interval frequency of two years. (Reference 3).

2.2 Description

The old Stauffer Chemical Company plant covered a total area of approximately 112 acres. Thirteen acres, enclosed within a fence, made up the production and storage area. The main building, which exhibits major deterioration and damage possibly caused by fire, is within this fenced area. A concrete sump is located on the western side of the main building. Two concrete carbon disulfide pits are located in front of the building, adjacent to the railroad tracks. A concrete pad is found east of the northernmost warehouse. A cooling tower is located between the concrete pits and the fence. (Reference 6, p. 2-1). There are also water filled reservoirs with vigorous algae growth and in which fish swim. (Reference 4, p. 5).

A large, barren area, devoid of vegetation, is located in the southern corner of the fenced area. This barren area is apparently an ash/sulfur disposal area. A larger ash/sulfur disposal area, approximately two acres in size, and brick dump area are located to the north of the site [outside the fenced area]. (Reference 6, p. 2-1). The barren area's size, once estimated to be 0.5 acres, was subsequently measured to be 300 feet by 150 feet. An auger showed the depth of the material to be two feet. (Reference 7, p. 2-3). A third fill area, approximately 1.2 acres, is located southwest of the plant along the railroad. The material at this site appears to be composed of earthen material and refuse. (Reference 5, p. 14; Appendix B).

An acid pond was also located outside the fenced area to the north [beside the brick dump]. The pond's size was estimated to be approximately 325 feet by 70 feet with water 2 to 3 feet deep, or 340,000 gallons. (Reference 6, pp. 2-1 and 3-1). However,

the berm for this pond, or waste lagoon, was subsequently breached (Appendix C, September 4, 1987 memorandum), and it was later observed to be approximately 150 feet by 25 feet and 2 feet deep. (Reference 7, p. 2-3). Deer tracks surround the pond and pine trees have been planted over the area, probably about 1970. (Reference 4, p. 6). There also is or was a lower pond on the Site which received flow and overflow from the acid pond and other sources.

In 1985, a crew constructing roads in a private subdivision [Quail Hollow Estates] removed surface soil in an area that ultimately turned out to be a former dumping pond for the Stauffer Chemical Company plant. After the ground cover had been stripped off, and a bulldozer became mired in mud, paint came off the bulldozer, and there were incidents of spontaneous combustion on the ground. (Appendix C, March 30, 1988 letter and February 9, 1990 memorandum; Appendix D).

Stauffer Chemical Company believes that a 1000 gallon fuel oil tank, a 500 gallon gasoline tank and a 300 gallon fuel oil tank remained on-site, and to the best of their knowledge these tanks were emptied. (Appendix C, January 18, 1983 letter).

Assessments from previous investigations indicate that some of the old structures might represent physical hazards. There were no warning signs and no good access restrictions. Children were reported to swim in concrete tank-type structures on the Site. (Appendix C, September 8, 1990 memorandum).

2.3 Operational History and Waste Characteristics

Stauffer Chemical Company owned and operated a carbon disulfide manufacturing plant at the facility until the plant closed in 1957[1]. Carbon disulfide is a volatile solvent for rubber and an insect fumigant. The plant may have also produced munitions during the 1940's. (Reference 5, p. 1).

The property has changed hands and been divided several times since it was closed. The original plant included homes [north]west of the railroad tracks, but it was divided when sold. Some of the property [north]west of the tracks, including the old office building, is now [or was formerly] owned by Mrs. Dorothy Kauffman[2]. (Reference 4, p. 7). Mr. Everette L. Habron was reported as owning the plant site in 1985. (Reference 6,

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[1]Reported dates of actual plant closure conflict. One report indicates 1950 (Reference 6), but it was probably actually closed in the mid-1950s. (Reference 4, p. 3). The plant was abandoned in 1957 (Reference 5, p. 1), and the company has apparently not owned the site since then (Appendix C, February 9, 1990 memorandum).

[2]The private school which operated out of the old office building was started by Reverend Bob Martin in the fall of 1982, and moved across the street January 1983. (References 4 and 6).

p. 2-2). However, other parts of the old plant site have been cut off. The property on which the lagoon existed is on Tract 4 of the Quail Hollow Estates, now or formerly owned by Mr. and Mrs. Raymond Fugatt. Apparently, all or part of the Quail Hollow Estates subdivision was formerly part of the plant site; reportedly it now contains several residences. (Appendix C, February 9, 1990 memorandum; Appendix D).

While the plant was operating, activities included the manufacturing of one primary product, carbon disulfide at an estimated approximate maximum capacity of 40 tons/day, and a by-product, sodium hydrosulfide resulting from a tail gas recovery system with an estimated approximate maximum capacity of 20 tons/day. Raw materials included dry sulfur, hardwood charcoal and/or oil coke, and sodium hydroxide 50 percent and coal for fuel with standby fuel oil. Stauffer Chemical Company has indicated that raw materials coming into the plant were generally totally reacted in the process except for some waste sulfur, residual ash from the reaction, filter sludges from sodium hydrosulfide and other furnace debris which were disposed of on the property. (Appendix C, January 18, 1983 letter).

According to Stauffer Chemical Company, to the best of their knowledge, the actual disposal locations for the waste that was generated from the manufacturing process included the barren area in the southwestern corner of the fenced area, and the area in the vicinity of the brick dump. There are no known records available to determine the actual quantity of waste disposed at the facility. (Reference 6, p. 2-3).

2.4 Regulatory and Sampling History

The facility has not operated for about 40 years; no permits pertaining to its operation are available. (Reference 6, p. 2-3).

Environmental samples from the Site have been gathered on several occasions. It appears that reliably reported analytical results including QA/QC qualifications have resulted in some instances, including:

1. Sampling performed September 1982, with results reported in the Report on Potential Superfund Site, EPA, 1983. (Reference 4).

2. Sampling performed February 1984, with results reported in the Site Inspection Report, NUS, 1985. (Reference 6).

3. Sampling performed May 1986, with results reported in the draft Field Trip Report, NUS, 1986 and the draft

Toxicological Assessment Report, NUS, 1987. (References 7 and 8).

2.5 Remedial Actions to Date

The 1985 report states that no remedial actions had occurred (Reference 6, p. 2-3); no evidence of any having occurred since then has been found.

3.0 WASTE/SOURCE SAMPLING LOCATIONS AND ANALYTICAL RESULTS

Waste disposal areas both north and south of the abandoned process areas and structures have been identified. Figure 3 presents a sketch of the vicinity of the Site. It indicates these areas as well as approximate sampling locations; it also identifies the samples by number. Table III summarizes reliably reported analytical results for analyses performed on samples from five areas of the Site which could be sources for the spread of waste constituents. These areas of potential waste/sources are designated as "A" through "E" on Figure 3, and correspond to the barren area, area 2, the acid pond, acid pond sediments, and process areas, respectively. No sampling results were found for the fill area, apparently earthen and refuse, found southwest of the plant along the railroad. This location is designated as "F" on Figure 3.

Samples are identified by their assigned numbers as given in previous reports; these numbers are given both on the figure and listed in the table. The table includes references to the reports in which the sampling data may be found.

4.0 GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

The site is located within the Valley and Ridge Physiographic Province of Virginia. The Valley and Ridge consists of a series of northeast-southwest trending anticlines and synclines. Major thrust faults are common. The terrain is characterized by narrow valleys underlain by shale, limestone, and dolomite, and ridges formed by resistant sandstones, quartzites and conglomerates.

Groundwater in the Valley and Ridge occurs within voids, bedding plains, fractures, and solution channels. Carbonates in valleys frequently contain solution channels through which large volumes of water are transmitted and stored. Sandstones on the ridges contain water within pore spaces between individual grains. Calcareous sandstones are often excellent aquifers. Silica-cemented sandstones have practically no permeability

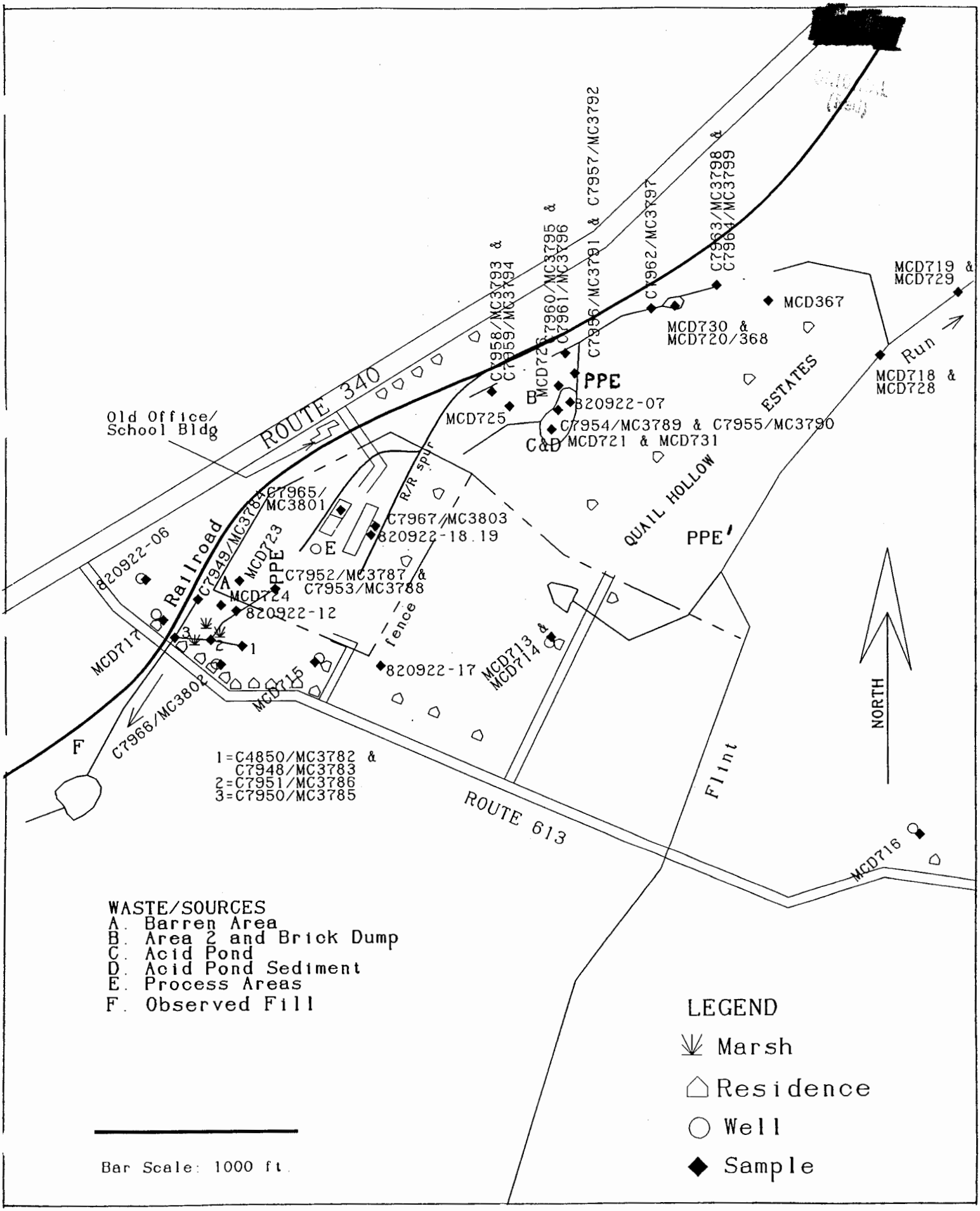


Figure 3. Site Sketch

Table III. Waste/Source Sampling Results

WASTE/SOURCE SAMPLING RESULTS [ppm]					
CONTAMINANT	Barren Area[1]	Area 2[2]	Acid Pond[3]	Acid Pond Sediment[4]	Process Areas[5]
Aluminum	1930	17400	159	9890	5510
Arsenic			0.113	7	21.7
Antimony					3.4
Barium	413	830		207	210
Beryllium			0.013	0.38	
Boron					16.6
Cadmium	0.044		0.003	0.08	0.59
Chromium		172	3.23	75	53.5
Cobalt			0.107		7.5
Copper		361	0.41	98	165
Cyanide					0.3
Iron	10700	22900	488	16500	203200
Lead	37	122		72	32.9
Magnesium	223	621	55.8	655	
Manganese		262	18.9	61	542
Mercury		0.47			
Nickel	0.061	25	0.375	2	78.9
Selenium				0.2	0.4
Sodium			88.1		
Vanadium	15	95	0.503	31	15.6
Zinc		88	2.27	20	52.4

Notes: 1. Solid Matrix, Sample Nos: 820922-12 (Reference 4); MCD723, MCD724 (Reference 7).
2. Solid Matrix, Sample Nos: MCD725, MCD726 (Reference 7).
3. Aqueous Matrix, Sample Nos: C7954/MC3789 (Reference 6); MCD721 (Reference 7).
4. Solid Matrix, Sample Nos: C7955/MC3790 (Reference 6); MCD731 (Reference 7).
5. Solid Matrix, Sample Nos: C7967/MC3803, C7965/MC3801 (Reference 6).

unless fractured; however, major thrust faults throughout the Valley and Ridge have created extensive zones of fracturing which often interconnect groundwater in different rock types.

A cross section taken from Reference 4 illustrates a northwest-southeast transect that traverses the Site and the adjacent area; it indicates that the underlying geology is stratigraphically and structurally complex, a result of extensive deformation through folding and faulting. (Appendix B). This cross section has the Site being underlain by near vertical limestones and dolomites (unit 6) at the nose of a tight anticlinal fold. As much of the area is underlain by carbonates subjected to extensive structural deformation, hydraulic conductivity between these rocks may be well developed through interconnected fractures and solution channels. (Reference 6).

The depth to limestone bedrock is unknown. Overlying the bedrock are scattered, more recent surficial deposits that are reportedly composed of sand, silt, and gravel. The thickest accumulation of these sediments as drawn in the cross section is approximately 100 feet. According to the General Soil Map of Virginia, 1979, the site is underlain by the Fredrick-Lodi soil type. The soils are shallow to very deep, and formed in residuum from limestone or interbedded limestone, sandstone, and shale. The permeability is moderate to moderately slow. (Reference 6).

4.2 Sample Locations and Analytical Results

The sketch in Figure 3 indicates the approximate location of the groundwater wells which have been sampled in the vicinity of the Site. Table IV summarizes reliably reported analytical results for analyses performed on the groundwater samples from these wells. The samples are identified by their assigned numbers as given in the previous reports; these numbers are both shown on the figure and listed in the table. The table also includes references to the reports in which the data may be found.

It should be noted that one sample, #820922-06, was found to contain over 100 different volatile organic compounds. (Reference 4, p. 7). Analytical results have been summarized as follows: benzene (1,200 ppb), toluene (1,000 ppb), and ethyl benzene (105 ppb). This sample is from one of the two on-site industrial wells[3]. (Reference 6, p. 2-3). A subsequent investigation attempted, but failed, to obtain a sample from the

[3]At the time, this well was being used by a private school. The Virginia Health Department ruled the well unsafe and shut it down; notification occurred January 3, 1983. (Reference 4, p. 7). The school moved across the street where it would have its own drinking water well.

Table IV. Groundwater Pathway Sampling Results.

Groundwater Pathway Sampling Results [ppb]						
Well Sample	820922-06*	MCD715	C7966/MC3802	MCD717	MCD713,14	MCD716
Well depth	600		386	35		65
Distance (mi)	0.05	0.07	0.10	0.10	0.22	0.64
Magnesium		28900		22500	6650	24000
Sodium		4330		16300	3370	10300
Zinc				158	47	143
References	4	7	6, App. C	7	7	7

* This sample was found to contain over 100 different volatile organic compounds (Reference 4).

other industrial well on-site.[4]

A Virginia Health Department Survey, in apparent reference to sample #820922-06 data, reports high levels of benzene (1,200 mcg/L), toluene (1000 mcg/L), acetone (100-1000 mcg/L), hexane (100-1000 mcg/l), xylene isomers (1000-10,000 mcg/L), and other volatile organic compounds. It also mentions that, since Stauffer Chemical Company did not use petroleum distillates as part of its major industrial activities, the original source of pollution remains unclear. (Appendix C, January 26, 1983 memorandum).

4.3 Targets

Regionally, groundwater flow would be expected to flow northwest toward discharge into the South Fork Shenandoah River. This would be affected locally by the complex subsurface geohydrologic conditions described above as well as the influence of intervening surface topography and drainage ways. The Site lies on a surface water divide with flow off-site in either of two directions, southwest and northeast.

There is no public water supply system serving the immediate vicinity of the site. All residents use either home wells, usually 20 to 30 feet deep, or cisterns. Some residents may have deeper home wells. Those people who employ cisterns as their drinking water source obtain their water from Front Royal Water System, who trucks it in for them. Rainwater is also collected

[4]The well located near the carbon disulfide pits could not be sampled because its rusted pump could not be removed. A metal plate is located on the well shed floor, beside the rusted pump. A future sample from the well can be obtained by removing the metal plate. (Reference 6, p. 5-3).

in cisterns. Groundwater is not used in the cistern system. There are two deep production wells existing on Site. (Reference 6, p. 3-1).

For the purposes of this investigation, one half of the site centered population distribution given in Table I is assumed to represent potential targets relative to groundwater consumption. This should account for cistern use as well as for uncertain groundwater flow patterns due to the Site's complex geohydrology. Furthermore, use of shallow (residuum) wells and deep (bedrock) wells is assumed to be split equally between those using groundwater wells as their drinking water source.

4.4 Conclusions

Upon evaluation of the information summarized above, it appears that certain hazardous substances found in waste/source ares of the Site have the potential to be released into and affect the groundwater beneath the Site.

5.0 SURFACE WATER PATHWAY

5.1 Local Hydrology/Targets

The Site is located on a drainage divide and is outside of flood plains. Drainage from the southern part of the Site makes its way into the surface water pathway which begins at the two springs south of the abandoned process areas. See Figure 3. Both springs flow into a marshy area nearby, one after cutting through the disposal area designated as the barren area which is located south of the old plant. From the marshy area, surface water flow would be to/in unnamed tributaries until it reaches the South Fork Shenandoah River located about 2.5 miles downstream. From there, the river meanders northeasterly toward the town of Front Royal. The river forms the eastern boundary of the George Washington National Forest for about 10.5 miles. The 15 miles of interest along this pathway ends in the South Fork Shenandoah before it reaches Front Royal. (References 1, 4, and 6).

Previous investigations concluded that the 340,000 gallon pond, the acid pond which then existed on the Site, was a major concern. Adjacent to the brick dump and the rest of the Area 2 waste/source, discharge from it would flow along an unnamed tributary, including a short distance along a railroad drainage ditch and then through another lower pond, to Flint Run about 0.4 miles downstream. It should be noted that points along Flint Run upstream from this confluence could also receive waste constituents from waste/sources on-site via the groundwater-to-surface water pathway. See Figure 3; note the location

identified PPE', a secondary probable point of entry. (References 4, 6 and 7).

Flint Run flows northeasterly and into the South Fork Shenandoah River about 4.7 miles downstream. From there, the South Fork Shenandoah flows about 7.2 miles to reach Front Royal, which is located about 11.9 miles downstream from the Site. The remainder of the 15 miles of interest along this pathway lies in the South Fork Shenandoah below Front Royal. (Reference 1).

Front Royal maintains drinking water intakes which serve about 12,100 people. (Appendix D). The U.S. Geological Survey maintains a gaging station on the South Fork Shenandoah at Front Royal. There, the river's annual mean discharge is 1595 cubic feet per second for a drainage area of 1642 square miles. (Appendix D). Of this total drainage area, the unnamed tributary flowing south from the Site contributes about one percent. Flint Run's contribution is about 5 percent; of that, about one quarter is above the confluence of the unnamed tributary from the Site. (Reference 1). Estimates of flowrates for individual surface water pathway segments based on these proportionalities should be reasonable.

The South Fork Shenandoah River is used for a variety of recreational purposes, particularly rafting and canoeing [and fishing]. (Reference 6). There apparently is a boat landing ¼ mile up Flint Run from its mouth at the river, but it has been suggested that Flint Run is otherwise too small and shallow running to support fish. (Reference 6, Appendix F). However, since the appropriate assessment of this Site's impact on its surroundings seems sensitive to this question, some additional local investigation may be warranted to verify whether or not Flint Run actually produces locally consumed fish or other aquatic life.

5.2 Sample Locations and Analytical Results

The information on the sketch in Figure 3 includes the approximate location of the surface water and sediment samples which have been gathered, for both the southwest and northeast pathways. Table V summarizes reliably reported analytical results for analyses performed on samples gathered along the southwesterly surface water pathway from the Site. Likewise, Table VI summarizes reliably reported analytical results for analyses performed on samples gathered along the northeasterly surface water pathway. Samples are identified by their assigned numbers as given in the previous reports. These numbers are indicated both on the figure and listed in the tables, and the tables include references to the reports in which the data may be found.

Table V. Southwesterly Surface Water Sampling Results.

SOUTHWESTERLY SURFACE WATER PATHWAY SAMPLING RESULTS [ppb]							
Sample No.	C7953/ MC3788	C7952/ MC3787	C7949/ MC3784	C7948/ MC3783	C4850/ MC3782	C7951/ MC3786	C7950/ MC3785
Matrix	Aqueous	Solid	Solid	Solid	Aqueous	Solid	Solid
Dist (mi)	0.00	0.00	0.05	0.05	0.05	0.10	0.14
Aluminum	12240	1843000	2436000	2378000	121000	7225000	866000
Arsenic		580	4400	2800		4400	1000
Barium	227	463000	245000	47900		98600	16600
Cadmium		200					
Chromium	10	5200	9900	8300	118	12100	3800
Cobalt		3200			104		
Copper		23800	12600	7600	441	11300	19600
Cyanide	16	775		250			
Iron	8638	8880000	9115000	10010000	23350	19990000	3119000
Lead		18000	29500	11000		25300	19700
Manganese	1024	104000	17000	117000	13530	147000	21500
Mercury				150			
Nickel		380000	3400		182	3200	13000
Selenium		100	300	200		250	
Vanadium			18000	20300		31600	
Zinc	78	8500	10100	5700	492	18300	13700
Reference(s)	6	6	6	6	6	6	6

As noted above, points along Flint Run upstream from the confluence with its unnamed tributary from the Site and below the location identified as PPE' on Figure 3 could also receive waste constituents from waste/sources on-site via the groundwater-to-surface water pathway. For this reason, the samples taken from locations along this segment of Flint Run are included in Table VI as part of the surface water pathway.

In addition to the data presented in the tables, the pH of the acid pond has been reported at 2.4. (Reference 4, p. 6). Other investigations reported a 2.2 pH there, and pH of 1.3 in the trickle outflow. (Appendix C, September 8, 1990 memorandum).

5.3 Conclusions

Upon evaluation of the information summarized above, it appears that certain hazardous substances found in waste/source ~~ares~~ areas of the Site are found in the surface waters leaving the Site at Level II contamination concentrations, in both Flint Run and the unnamed tributary leading to it and in the marshy area

Table VI. Northeasterly Surface Water Sampling Results.

NORTHEASTERLY DIRECTION SURFACE WATER PATHWAY SAMPLING RESULTS [ppb]															
Sample No.	C7958/ MC3793	C7959/ MC3794	C7956/ MC3791	C7957/ MC3792	C7961/ MC3796	C7960/ MC3795	C7962/ MC3797	MCD720 & MCD368	MCD730	C7963/ MC3798	C7964/ MC3799	MCD718	MCD728	MCD719	MCD729
Matrix	Aqueous	Solid	Aqueous	Solid	Solid	Aqueous	Solid	Aqueous	Solid	Aqueous	Solid	Aqueous	Solid	Aqueous	Solid
Dist (mi)	-0.05	-0.05	0.02	0.02	0.04	0.04	0.11	0.13	0.13	0.17	0.17	0.40	0.40	0.50	0.50
Aluminum	1178	6155000	90670	6850000	4650000	24670	5415000	116000	6880000	31550	13355000		7260000	4260	8180000
Arsenic		4200		8500	10000		10900	68			2000				
Barium		48400	113	132000	194000		65400		89000		12700		64000		69000
Beryllium								11							
Boron			126	5400	9400										
Cadmium		150	4.8								170				
Chromium		8900	2553	19200	144000	564	23100	2310		883	22800		33300	50	50700
Cobalt		3400	61	10600			4700	122		60	3400		25000		19000
Copper		33600	233	30600	22200		21900	400			40900				
Cyanide	14			650	4250	12	350								
Iron	805	9420000	151300	11095000	28055000	40730	15745000	257000	22700000	46150	24635000		34500000		38200000
Lead		23600	72	19000	25500		14000	18	23000		4700		16000		
Magnesium								50400	327000			5670	1670000	6930	1070000
Manganese	69	47700	17570	38300	45700	2848	44200	15300		6224	76100		714000	568	659000
Mercury						0.2			150						
Nickel		2800	191	19000	4200		8700	310		63	18500		19000		
Selenium		150		450	350		300								
Sodium								74600				3530		5610	
Vanadium		19100		16900	39500		27700	345	37000		58500		80300		82000
Zinc		35400	1874	25900	15600	286	19800	1800	48000	677	32900		57000	43	45000
References	6	6	6	6	6	6	6	7	7	6	6	7	7	7	7

southwest of the Site, and have a limited potential to affect targets downstream in both cases.

6.0 SOIL EXPOSURE AND AIR PATHWAYS

6.1 Sample Locations and Analytical Results

In addition to the waste/source samples and the other samples discussed above, the sketch in Figure 3 indicates the approximate location of additional soil samples gathered in the vicinity of the Site. Table VII summarizes reliably reported analytical results for these samples. They are identified by their assigned numbers as given in previous reports. The table also includes references to the reports in which the data may be found.

Table VII. Soil Sampling Results

SOIL SAMPLING RESULTS [ppm]		
Sample No.	820922-17*	MCD376
Aluminum		7560
Arsenic	< 0.002	
Barium	< 0.166	97
Cadmium	< 0.010	
Chromium	< 0.050	
Iron		13400
Lead	< 0.100	32
Magnesium		382
Manganese		93
Mercury	< 0.0002	0.14
Nickel	< 0.050	
Selenium	< 0.002	
Vanadium		29
References	4	7

* Background

6.2 Targets

For the purposes of this investigation, the site-centered population distribution given in Table I is assumed to represent potential targets, for both the soil exposure and air pathways.

6.3 Conclusions

Upon evaluation of the information summarized above, it appears that certain hazardous substances found in waste/source ares of the Site are found in surrounding soils at Level II contamination concentrations and have the potential for contact exposure. Also it appears that these substances have a limited potential to migrate through the air.

7.0 REFERENCES

1. U.S. Geological Survey, 7.5-minute topographic quadrangle maps of Virginia: Bentonville, 1966, photoinspected 1972; Strasburg, 1966, photorevised 1986; Front Royal, 1967, photorevised 1986; Chester Gap, 1967.

2. National Oceanic and Atmospheric Administration, Climatological Data Annual Summary, Virginia 1990, Vol. 100, No. 13.

3. U.S. Department of Commerce, Technical Paper No. 40, 1961.

4. U.S. Environmental Protection Agency - Region III, Report on Potential Superfund Site - Stauffer Chemical @ Bentonville, Virginia, January 12, 1983.

5. U.S. Environmental Protection Agency - Environmental Monitoring Systems Laboratory, Site Investigation, Stauffer Chemical Plant - Bentonville, Virginia, June 1983.

6. NUS Corporation, Site Inspection, Stauffer-Bentonville Site, October 15, 1985.

7. NUS Corporation, Draft Field Trip Report, Stauffer-Bentonville Site, August 11, 1986.

8. NUS Corporation, Draft Toxicological Assessment Report, Stauffer-Bentonville Site, January 30, 1987.

Appendix A

Record Information

1. Site Name: Stauffer Chem
   (as entered in CERCLIS)
2. Site CERCLIS Number: VAD980551634 (VA-273)
3. Site Reviewer: E. D. Gillispie
4. Date: June 1994 (Revised December 1994)
5. Site Location: Warren County (Bentonville), VA
   (City/County,State)
6. Congressional District: 07
7. Site Coordinates: Single

   Latitude: 38 49'58.0" Longitude: 078 18'47.0"

Site Description

1. Setting: Urban
2. Current Owner: Multiple Owners
3. Current Site Status: Inactive
4. Years of Operation: Inactive Site,from and to dates: pre 1940 to 1957
5. How Initially Identified: Unknown
6. Entity Responsible for Waste Generation:
   - Manufacturing
   - Misc. Chemical Products
7. Site Activities/Waste Deposition:
   - Surface Impoundment
   - Waste Piles
   - Discharge to Sewer/Surface Water

Waste Description

8. Wastes Deposited or Detected Onsite:

- Inorganic Chemicals
- Explosives
- Metals
- Fly and Bottom Ash

Response Actions

9. Response/Removal Actions:

- Drinking Water Well Has Been Closed

RCRA Information

10. For All Active Facilities, RCRA Site Status:

- Not Applicable

Demographic Information

11. Workers Present Onsite: No
12. Distance to Nearest Non-Worker Individual: Onsite
13. Residential Population Within 1 Mile: 467.0
14. Residential Population Within 4 Miles: 1544.0

Water Use Information

15. Local Drinking Water Supply Source:

- Ground Water (within 4 mile distance limit)
- Surface Water (within 15 mile distance limit)

16. Total Population Served by Local Drinking Water Supply Source: 12872.0

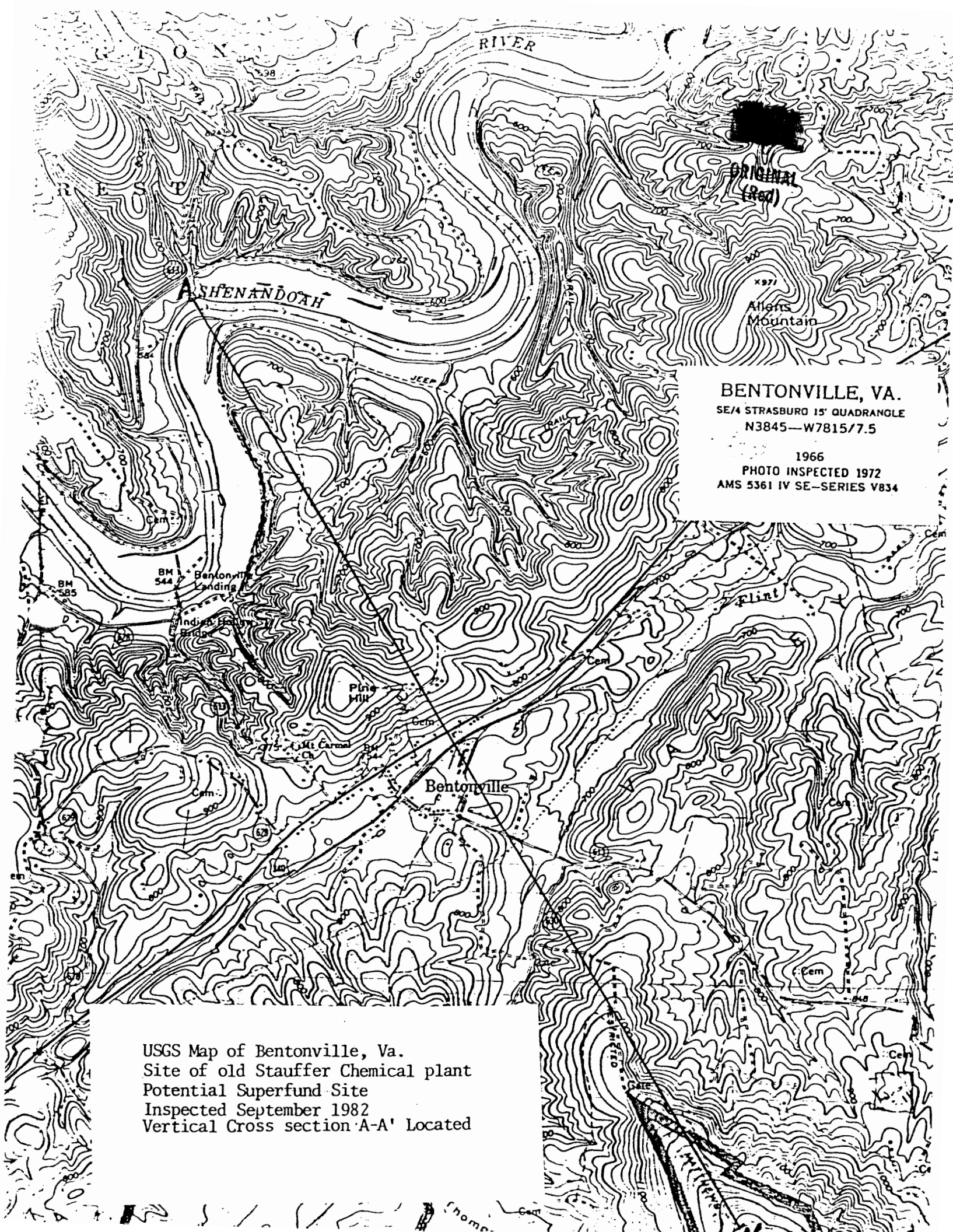
7. Drinking Water Supply System Type for Local Drinking Water Supply Sources:

   - Municipal (Services over 25 People)
   - Private

18. Surface Water Adjacent to/Draining Site:

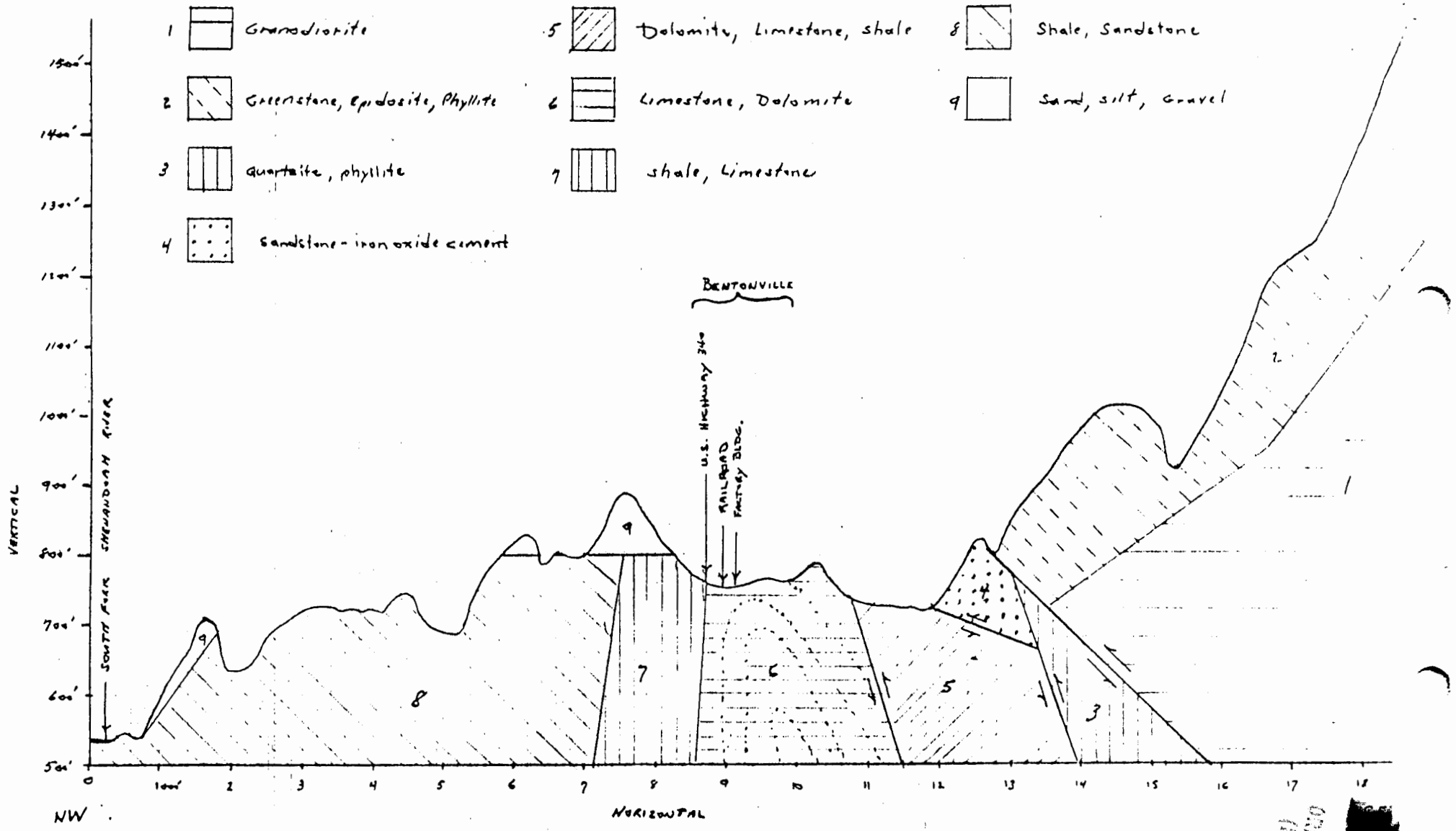
   - Contaminated Stream
   - Contaminated Wetland

Appendix B



USGS Map of Bentonville, Va.
Site of old Stauffer Chemical plant
Potential Superfund Site
Inspected September 1982
Vertical Cross section A-A' Located

APPROXIMATE STRATIGRAPHIC CROSS-SECTION — — BENTONVILLE, VA.



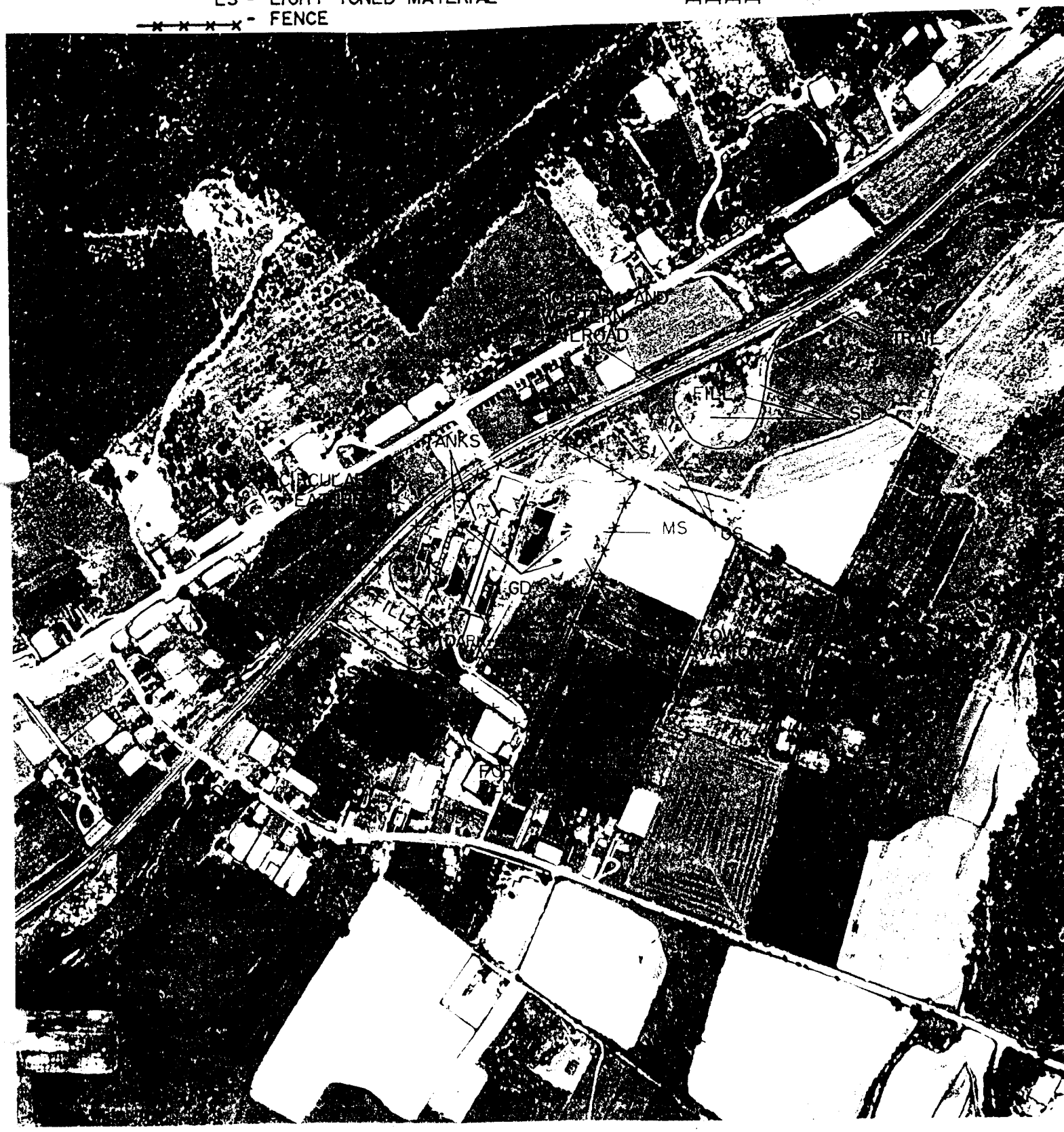
vertical exaggeration: 10x

STAUFFER CHEMICAL PLANT MAY 30, 1958 APPROX SCALE 1:5,450

LEGEND

S - STRUCTURE
GD - GROUND DISCOLORATION
GS - GROUND SCAR
SL - STANDING LIQUID
MS - MATERIAL STORAGE
LS - LIGHT-TONED MATERIAL
- FENCE

- DRAINAGE
- WATERSHED DIVIDE
- HISTORICAL BOUNDARY
- INSTALLATION BOUNDARY
- RAILROAD
- PIPELINE



Appendix C

Stauffer Chemical Company
Westport, Connecticut 06881 / Tel. (203) 222-3000 / Cable "Staufchem"

January 18, 1983

J.A. Fromal, III
Pollution Control Engineer
Commonwealth of Virginia
State Water Control Board
Valley Regional Office
P.O. Box 268
Bridgewater, VA 22812

Re: Former Stauffer Chemical Company Property -
Bentonville, Va.

Dear Mr. Fromal:

In response to your recent questions regarding the activities conducted at the former Stauffer Chemical Company property in Bentonville, Va. I have obtained the following information.

The plant manufactured one primary product; carbon disulfide at an estimated approximate maximum capacity of 40 tons/day and a by-product sodium hydrosulfide resulting from a tail gas recovery system with an estimated approximate maximum capacity of 20 tons/day. Raw materials included dry sulfur, hardwood charcoal and/or oil coke, and sodium hydroxide 50% and coal for fuel with standby fuel oil.

The process consisted of melting the dry sulfur and feeding it in liquid form to cast iron retorts in a bank of furnaces fueled by powdered coal where it was vaporized. The vaporized sulfur reacted with carbon in a reactor section above each retort to form carbon disulfide and hydrogen sulfide. This gas stream passed through various separation and condensation stages to separate the two materials and trace sulfur. The primary product received a final distillation and condensation and was stored as a liquid. The hydrogen sulfide passed through an oil absorption system for purification and separation of traces of carbon disulfide and was absorbed with 50% sodium hydroxide to produce the by-product sodium hydrosulfide. Residual tail gas was incinerated.

Raw materials coming into the plant have been noted above and were generally totally reacted in the process except for some waste sulfur, residual ash from the reaction, filter sludges from sodium hydrosulfide and other furnace debris which were disposed of on the property. In addition, Stauffer believes that a 1,000 gallon fuel oil tank, a 500 gallon gaseline tank and a 300 gallon fuel oil tank remain on-site. To the best of our knowledge these tanks were emptied.

Regarding the oil absorption system discussed above, and the following information can be given about its operation. The absorption oil was purchased from Ashland Oil Company with the following specifications:

Specific Gravity	40.9
Flash Point	136°C
Boiling Point	350°C
Boiling Point/End Point	530°C
Saturates	83.9%
Olefins	2.5%
Aromatics	13.6%

This oil was used at a rate of about 1,200 gal./year in a closed system and there is no history of major spills or any disposal of such material on-site.

Based on the characteristics of this oil, Stauffer does not believe that it can be related to the contamination noted in the well water analysis you reported. The high boiling point of the absorption oil would preclude the presence of benzene or toluene. Additionally, the saturates, olefins and probably the aromatics would have been biodegraded over this period of time. Again, I would reiterate that there is no history of oil spillage or any disposal from this system on-site.

In conclusion, Stauffer has not been able to find any evidence which would indicate that our former plant operations involved the use of any of the chemicals related to the well water contamination you have reported. It should be noted that 1-2-dichloroethane has been used as a constituent in leaded gas. The plant had only the single gasoline tank with no history of any leakage taking place.

I hope the information provided here is of assistance to you. Once again I would appreciate receiving a copy of the results of your analysis and any other information you obtain regarding this matter. If you have any further questions please do not hesitate to call.

Very truly yours,

Bruce S. McClellan

BSM009:dm

cc: Cathy Harris ✓
Va. State Health Dept.
Eric Johnson
U.S. E.P.A. Region III

DR. CATHY HARRIS

[redacted]

COMMONWEALTH of VIRGINIA

Department of Health
Richmond, Va. 23219

JAMES B. KENLEY, M.D.
COMMISSIONER

January 26, 1983

MEMORANDUM

TO: Robert B. Stroube, M.D., Assistant Commissioner
Office of Health Protection and Environmental Management

THROUGH: Grayson B. Miller, Jr., M.D., Director
Division of Epidemiology

FROM: Brandon S. Centerwall, M.D., Assistant State Epidemiologist

SUBJECT: Contaminated Well in Bentonville, Virginia: The Health Survey

On December 23, 1982, the Office of Health Protection and Environmental Management was informed by the State Water Control Board (SWCB) of a chemically polluted well in Bentonville. Residents were advised through Dr. Paul Pedersen, Director of the Lord Fairfax Health District, to cease all uses of the well water as of January 4. Dr. Cathy Harris, Director of Kepone Studies, and Dr. Brandon Centerwall, Assistant State Epidemiologist, made arrangements to survey the health of the community on January 12-13.

Bentonville is a small rural community in the Shenandoah Valley (population 150-200). Households obtain water from individual wells and rain cisterns. The principle industry was the Stauffer Chemical Company -- a manufacturer of carbon disulfide (CS_2) -- until the facility closed in 1958. The implicated well is a deep well (about 600 feet) on the Stauffer plant site; it originally supplied the plant with water for industrial purposes. At the time the well was closed it was serving as a general water source for approximately 12 persons.

Approximately a year ago the well water became abruptly foul with an odor and grossly visible chemical contamination. From then until the well was closed, the water was not typically used for personal consumption unless it had been filtered. On September 14, 1982, the well water problem came to the attention of the SWCB and the Environmental Protection Agency (EPA). Water samples were taken September 27 - October 4. EPA analysis of the water samples revealed high levels of benzene (1200 mcg/L), toluene (1000 mcg/L), acetone (100-1000 mcg/L), hexane (100-1000 mcg/L), xylene isomers (1000-10,000 mcg/L), and other volatile organic compounds. These results were reported to the SWCB on December 15. In turn, the Office of Health Protection and Environmental Management was alerted on December 23.

Following the closure of the well, the extent of the problem was assessed. Drs. Cathy Harris and Brandon Centerwall conducted a door-to-door health survey of Bentonville residents. All houses within a half-mile radius of the implicated well were visited and a general health survey made of the residents (see attached questionnaire). Half of the respondents used rain cisterns; these served as a control group to which the well-water group could be compared. It is estimated that approximately two-thirds of all households were contacted and surveyed.

Results (see Table)

Thirty-seven households were interviewed, comprising 92 residents of Bentonville. Well-users and cistern-users were equivalent in race, sex and household-size distribution. Cistern-users were nine years older, on the average, than were well-users. To control for this, the frequency of chronic underlying disease was calculated separately for individuals greater than 40 years of age and for individuals less than or equal to 40 years of age.

Twenty percent of people using well-water had a chronic underlying disease, as compared to 16 percent of cistern-users. The distribution of diseases was approximately the same in the two groups. No cases of cancer were reported. The distribution of recent illnesses, health changes and deaths were approximately equivalent. No statistically significant differences were observed between well-users and cistern-users, whether considered as a whole or when broken down by age group. There were no complaints regarding well water from wells other than the one originally implicated.

In conclusion, a health survey conducted in Bentonville found that the general health of people using well water was equivalent to that of people using rain cisterns.

Since Stauffer Chemical Company did not use petroleum distillates as part of its major industrial activities, the original source of pollution remains unclear at this time. The most plausible candidate is leakage from an underground fuel storage tank. Sites of six such tanks have been located in Bentonville. Analysis of water from other Bentonville wells is pending.

BSC/mk
Attachments

Cc: Dr. Cathy Harris
Dr. Paul Pedersen
Dr. Malcolm Tenney, Jr.

HEALTH SURVEY: BENTONVILLE, VIRGINIA, JAN. 12-13, 1983

Source of Water

	Well (N=49)	Cistern (N=43)
Demographics		
White	100%	100%
Male	41%	42%
Mean household size	2.58	2.39
Mean age	35.9 years	44.6 years
Health History		
Chronic Underlying Disease	10 (20%)	7 (16%)
Hypertension	4	4
Cardiovascular Disease	2	1
Diabetes	0	2*
Peptic Ulcer	2	1
Rheumatoid Arthritis	1	0
Allergies	1	0
Cancer	0	0
>40 years old	7/17 (41%)	7/25 (28%)
≤40 years old	3/32 (9%)	0/18 (0%)
Illnesses in past 2 years	2	1
Health Changes in past 2 years	1	1
Deaths in past 2 years	1	2

*One person had both diabetes and hypertension.

Stauffer [redacted]

MEMORANDUM

VIRGINIA WATER CONTROL BOARD

Valley Regional Office

116 North Main St. - P.O. Box 268 Bridgewater, VA 22812

SUBJECT: PC 88-182, Ken Thurston Well, Bentonville (Warren County)

TO: VRO PReP File

FROM: Mac Sterrett RMS

DATE: 4 September 1987

COPIES: PReP Central, Rick Black - Warren County Health Department

On 1 September 1987 I received a call from Mr. Ken Thurston (Box 242, Bentonville, Virginia 22610 703-635-5843) who indicated his well had become contaminated with a thick white substance resembling Latex paint washed from a paint brush. The contamination had begun approximately one week prior.

On 2 September I met Mr. Thurston at his home at 0940. Mr. Thurston is located approximately 200 yards south of the abandoned Stauffer Chemical Company at Bentonville. Stauffer was a manufacturer of carbon disulfide which was produced for Avtex Fibers Company in Front Royal. The plant reportedly closed in 1961. Previous reports of ground water contamination in the area have been investigated and centered around possible petroleum problems. The site was jointly investigated by EPA/VWCB in September 1982 as a preliminary investigation for the Eckherd Committee list comprising sites for possible Superfund action. A ground water analysis from that investigation yielded a multi-page list of organic chemicals discovered in the water.

Mr. Thurston's problem began about seven days ago, about two days following a heavy rain event. The water from his well, reportedly 386 feet deep with eight feet of casing, literally looks like milk. It has a high solids content which settles out after approximately one hour. I had asked Mr. Thurston not to pump the well 24 hours prior to my visit. When we turned on the water it was extremely milky, and after allowing it to run for one hour and 40 minutes it had gotten increasingly worse. pH at the initial cut-on was 7.00 (meter), and at the time of sampling one hour and 40 minutes later was 7.15. The water has an odor resembling chlorine, and the Thurstons report that the hot water has a sulfur smell.

A two-acre undeveloped field immediately north of the Thurston property and south of Stauffer receives runoff from the Stauffer plant site. Large quantities of unknown waste are all over the plant site; sulfur is obvious, as are cinders. A waste lagoon is situated to the north side of the plant. This lagoon, which was sampled by

EPA in September 1982, has now been breached by the new owner of the property, a Mr. Ray Fugat. Mr. Thurston and I walked along the N & W Railway and stayed on railroad property to look over onto the Stauffer site. The berm of the waste lagoon has clearly been breached, probably by backhoe, to allow drainage of the waste to flow to the drainage ditch alongside the railroad. This apparently has occurred within the past year, according to Mr. Thurston. I took photos of the site.

Rick Black, Warren County Health Department Sanitarian, arrived at the Thurston residence while I was there. Mr. Black indicates that a new housing subdivision has recently gone in immediately east of the chemical plant. At some point during the construction of that subdivision, lagoon solids were placed along the road, and they caught fire. Mr. Black reports no other accounts of wells having been affected in the manner in which Mr. Thurston's well appears to be contaminated. Mr. Black checked the Thurston's water for chlorine using a Hach kit, but got no indication that chlorine was present.

Mr. Thurston reports that the problem has not abated any since it first began. He had the lab at Avtex (where he is employed) analyze a sample of the water, and they indicated to him that the hardness was 8,000 ppm, and also that chlorine was present but they could not measure it. The Thurstons have a copy of a water analysis done by the State Health Department on 29 July 1983; the analysis is for metals and TOC and shows nothing unusual. Apparently the well was sampled in conjunction with a survey in the area subsequent to our notifying the Health Department of potential ground water problems following our September 1982 investigation. I spoke with Gladys Cauley at VDH-Lexington, the office that performed the sampling. She also found in the file a 13 January 1983 lab sheet for the Thurston well showing that volatile organics had been detected. I mentioned that the Thurstons had not shown me that one; she said it had not been sent to them. She is sending me copies of the VDH letter/analysis.

This is incorrect VOC's were not detected RMS

The area is underlain by limestone formations, and I believe the problem is related to the compounds on the surface which are washing off of the Stauffer plant site. A dry sample of "soil" from near the pond area collected by Mr. Thurston on 1 September closely resembles the sediment in the water samples. A compound which visually resembles this "soil" can be found on the south side of the Stauffer plant in the two-acre field just north of the Thurston property.

Based on a visual inspection of Mr. Thurston's water and the lab's assertion that hardness is 8,000 ppm, I suspected calcium might be the contaminant. However, I could come up with no reason why it might be present in such high concentrations. However, Ray Tesh, VRO, suggests that H_2SO_4 probably was a by-product of the carbon disulfide manufacturing process and most likely would be treated as a waste. He theorizes that the H_2SO_4 was neutralized by the addition of lime, yielding $CaSO_4$, which is only slightly soluble in

water. When I mentioned this theory to Mr. Thurston by phone on 3 September, he became quite excited and suggested that might explain why he had been plagued with calcium deposits in his joints over the past several years. I cautioned him this was only one possibility and he certainly should not jump to conclusions, adding we might know more when analytical results are available. I suspect the possibility that organic compounds are present in the water, based on past experience at the site and on verbal information from VDH.

Mr. Thurston intends to let the well pump continuously for several days. I anticipate further involvement on this project.

Attachments

jes

LAW OFFICES
ADAMSON, CRUMP & SHARP, P. C.
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TELEX 197629
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March 30, 1988

Pauline Ewald,
DEPARTMENT OF WASTE MANAGEMENT
11th Floor
101 North 14th Street
Richmond, Virginia 23219

Re: Complaint regarding B. K. Haynes Corporation
Warren County, Virginia

Dear Ms. Ewald:

Thank you for taking the time to speak with me earlier this week regarding the anonymous telephone complaint you received concerning B. K. Haynes Corporation and a site in Bentonville, Warren County, Virginia. I would like to take a moment to confirm the substance of our conversation, and to provide you with some additional information which may be of use to you.

It is my understanding that, last week, you received an anonymous hotline tip from a woman, who claimed to be calling on behalf of her father and her brother, who indicated that her father and her brother had been involved in earth moving operations while in the employ of B. K. Haynes Corporation on a site in Bentonville, Virginia, about two or three weeks ago, and that they had uncovered a hazardous waste lagoon, which area had burst into flames, dissolved paint upon their bulldozer, and caused severe chemical burns to both men. Between conversations with Leah Williams of B. K. Haynes Corporation and me, you have been advised, or are now advised, as follows:

1. B. K. Haynes Corporation has not had any employees performing earth moving operations anywhere near Bentonville, Virginia, in the past two or three weeks.

2. B. K. Haynes Corporation did have employees involved in earth moving operations in the Bentonville area in early to mid-1985.

3. At that time, there was an incident in Bentonville generally similar to that described by your caller, when a crew constructing roads for B. K. Haynes Corporation in a private subdivision removed surface soil in an area that ultimately turned out to be a former dumping pond for a Stauffer Chemical Corporation plant, and after the groundcover had been stripped off, and a bulldozer became mired in mud, paint did come off the bulldozer, and there were incidents of spontaneous combustion on the ground. Shortly after these incidents, B. K. Haynes Corporation made a full report of these to your office, including submission of chemical and environmental analyses performed at our request and expense by Energy Ventures Analysis of Arlington, Virginia.

4. At the time of these incidents, a father and son were working for B. K. Haynes Corporation. These gentlemen were Elwood and Mervil Hensley. Both were discharged by B. K. Haynes Corporation within the last six (6) months, and Mervil Hensley has since threatened B. K. Haynes Corporation with complaints to environmental authorities regarding this work site.

5. At no time, either at the time they were working at or near this site, or since then, did either Elwood or Mervil Hensley, or any other employees of B. K. Haynes Corporation, ever make any complaint of suffering chemical burns, or suffering any other form of injury, in the vicinity of the Bentonville site.

6. Since our conversation with you last week, Ms. Williams has spoken to another employee of B. K. Haynes Corporation who was involved in the work at the Bentonville site. This employee indicates that he was the only one who operated equipment within the vicinity of the Stauffer waste pond, and that he was the one operating the bulldozer which became mired in the mud. The father and son who would have been at that site did not actually operate equipment in the area of the pond, and therefore would not have been in any position to be exposed to chemical burns.

7. To the best of our knowledge, the current owners of this property, which is described as Tract 4 on a plat which has already been furnished to your office, are Mr. and Mrs. Raymond Fugatt, P. O. Box 101, Bentonville, Virginia, 22610. Our records indicate that they have owned the subject property since February 9, 1985.

8. It appears from my records that B. K. Haynes Corporation would have completed its work on the roads in this subdivision by the middle of 1985, and that the Haynes company has not been involved in work out there since that time, with the sole exception of assisting Energy Ventures Analysis in its inspection of the site in 1986.

If we can be of any further assistance to you, please feel free to call me.

Very truly yours,

William W. Sharp

WWS;jfw

cc: Leah Williams - B. K. Haynes Corp.

File: 86-466-S

Anne

[redacted] follow-up on this Attp.

COMMONWEALTH of VIRGINIA

2/12/90 . K.C

DEPARTMENT OF WASTE MANAGEMENT
11th Floor, Monroe Building
101 N. 14th Street
Richmond, VA 23219
(804) 225-2667

MEMORANDUM

TO: K.C. Das

THROUGH: Dolph Lathrop DPL

FROM: Anne Field AMF

DATE: February 9, 1990

RE: B.K. Haynes Corporation/Letter of March 30, 1988

The March 30, 1988, letter concerns an anonymous complaint the Department received about the uncovering of a waste lagoon during road construction in a subdivision next to the old Stauffer Chemical Company site in Bentonville (Warren County).

Stauffer operated a carbon disulfide manufacturing plant in Bentonville until its closure in 1950. The company has apparently not owned the site since about 1957. NUS prepared a Site Investigation report in October, 1985.

The property on which the lagoon uncovering occurred is identified in the letter as Tract 4 and, according to the County Commissioner of Revenue's office, is in Quail Hollow Subdivision and is owned by Mr. and Mrs. Raymond Fugatt. At this time I am not sure if the Fugatt property was included in the area investigated by NUS, but it does sound as though there was some waste disposal activity by Stauffer on the property.

Since the Stauffer site is not on the NPL, it is one that is being evaluated by the State Cleanup Program. In fact, we have identified the site as one of the first that the state program should look at. We expect to visit the site in the near future and at that time we will try to determine if the tract 4 property presents any threat that should be addressed.

Let us know if you have any questions.

file
9/19/90

COMMONWEALTH of VIRGINIA

DEPARTMENT OF WASTE MANAGEMENT
11th Floor, Monroe Building
101 N. 14th Street
Richmond, VA 23219
(804) 225-2667

MEMORANDUM

TO: Cynthia V. Bailey

THROUGH: K.C. Das

FROM: Anne Field

DATE: February 22, 1990

RE: Stauffer Chemical Company Site - Bentonville

The former Stauffer Chemical Company plant in Bentonville is one of the sites being evaluated by the State Cleanup Program. We've recently contacted several Warren County officials about the site and have learned that it is of some concern in the area. Therefore, we thought we should let you know what we've learned so far.

Stauffer Chemical Company operated a carbon disulfide manufacturing plant in Bentonville, until closure in 1950. The Stauffer property was sold in the mid-1950's. Some of the site has apparently been developed into a residential subdivision. The old abandoned plant remains and is very dilapidated.

NUS conducted a CERCLA site investigation for EPA in February 1984. We are not sure if the part of the property that has been sub-divided was included in the investigation. The investigation found several waste disposal areas in a 13-acre fenced area including two ash/sulfur disposal areas and a fire brick dump. The fire bricks were high in chromium and were identified as a probable source of chromium in surface water at the site. The investigation also found an acid pond just outside of the fenced area. The report suggested that the acid was being generated by sulfur reacting with water.

The NUS report mentions 1982 sampling done by EPA and the Water Control Board which found benzene, toluene, and ethylbenze in an on-site industrial well then being used by a school. The well was subsequently closed by the Health Department.

In October, 1988, the Department of Waste Management received an anonymous complaint possibly related to the Stauffer operations (letter attached). The complaint apparently concerned an incident that occurred in 1985 when road construction for a subdivision uncovered an area described by the letter as "a former dumping pond for a Stauffer Chemical Corporation plant." When a bulldozer removed surface soil, "there were incidents of spontaneous combustion on the ground".

The Stauffer site has recently been getting some attention in the area. It's close to the South Fork Shenandoah upstream of Avtex and it manufactured carbon disulfide, a chemical used at Avtex. There is also concern about physical hazards at the site. Children reportedly swim in a pond on the site.

The State Cleanup Program targeted this site for evaluation last summer. The SI found elevated levels of chromium in a stream adjacent to the site. Contact with the Water Control Board's Valley Regional Office indicated it should be addressed, especially since no other regulatory agency was currently involved with the site. There also seemed to be several corrective actions that could be accomplished quickly, e.g. removal of the fire bricks. We wanted to visit the site and do some simple "confirmatory sampling" to help evaluate the need for corrective action before trying to contact the company about remedial action. Because the abandoned site is very overgrown, we planned the visit for winter. When we tried to get permission to go on the site, we ran into some difficulty locating the current owner. We've learned that the site was put into a spendthrift trust, and the remaining trustee has petitioned for, and received verbal approval of being removed as trustee. We've located the attorney for the apparent owner who has said he would try to get site access for us.

We hope to have access to visit the site soon and will keep you advised. Let us know if you have any questions.

COMMONWEALTH of VIRGINIA

DEPARTMENT OF WASTE MANAGEMENT
11th Floor, Monroe Building
101 N. 14th Street
Richmond, VA 23219
(804) 225-2667
TDD (804) 371-8737

Subject: Stauffer Chemical

To: K. C. Das

From: Anne Mason Field

Date: September 8, 1990

This is in response to your request for information on what has happened regarding the Stauffer site in Bentonville since my February 22, 1990, memo.

Jamie Walters, Glenn Metzler, and I visited the site in April. Dwight Sours of the Water Board's Valley Regional Office met us. He was familiar with the site and also brought a pH meter to test water at the site. (The Department did not have a functioning pH meter.)

We did not collect samples but did get some pH readings at the site. One very low pH (2.2) was found in water in a depression below a waste pile. A trickle of water flowing out of this area had a pH of 1.3. We followed the discharge as it flowed into a drainage ditch beside railroad tracks. The "ditch" then flowed into a pond. No water was leaving the pond that day; it was, however, evident that there is a discharge during higher water levels and there was water in the drainageway about 25 yards below the pond.

Glenn followed the drainageway to its confluence with Flint Run. A quick qualitative analysis of the benthos above and below the discharge of the drainageway did not reveal any gross change downstream of the discharge of the drainageway into Flint Run. (As you know macrobenthic organisms are used as indicators of the long-term effect of water quality on aquatic life and give a better indication of the effect of a site on surface water than simple chemical analysis of surface water samples.)

No samples were taken for laboratory analysis so the only site data we have is that taken by NUS during its February 22, 1984, site investigation. NUS did not take samples from two waste piles that still remain on site.

We noted that some of the old structures might represent a physical hazard. We have heard that children swim in concrete tank-type structures. We did not see any warning signs or good access restriction. (I subsequently called the Warren County Administrator's Office and the attorney for the site owner and told them they might want to check the site for potential physical hazards.)

I have done nothing further about this site. As you know I have been hesitant to contact "owners" concerning site remediation until I understood the agency's positions on the applicability of RCRA to state cleanup sites where waste was disposed of before 1980. I think this is being addressed now.

I think it would be helpful to me to have some clarification of how we should be addressing non-NPL sites at this time because of the limited resources that the agency is facing.

[redacted]

Appendix D

[redacted]

Virginia Department of Environmental Quality
PHONE LOG

Call to (from):	Of:	Phone: ( )
Kondra North	Front Royal Town Manager's Office	703-635-7819
Site: Stauffer Chem VA-273	**Date:** 4/27/94	**Time:** p.m.

Call by: E. D. Gillespie

Discussion:

Sought information on number of people served by S. Fork Shenandoah drinking water intakes at Front Royal.

She said that virtually all of Front Royal was served (11,880) plus a little of Warren County & industries to make a total of 12,100 people served

Follow up required: No

Virginia Department of Environmental Quality
PHONE LOG

Call to (from):	Of:	Phone: ( )
Mike Woodside	USGS	771-2427
Site: Stauffer Chem VA-273	**Date:** 4/27/94	**Time:** P.M.

Call by: E.D. Gillispie

Discussion:

Sought info of properties of S. Fork Shenandoah R. @ Front Royal.

1595 cfs average mean discharge for period of record (1900-06; 31-92).

1642 mi^2 drainage avece.

8500 cfs peak discharge 1992.

Follow up required: No

Virginia Department of Environmental Quality
PHONE LOG

Call to (from):	Of:	Phone: ( )
Wm Hull	Clerk's Office Warren Co. Circuit Ct.	635-2435
Site: Stauffer Chem VA-273	**Date:** 5/9/94	**Time:**

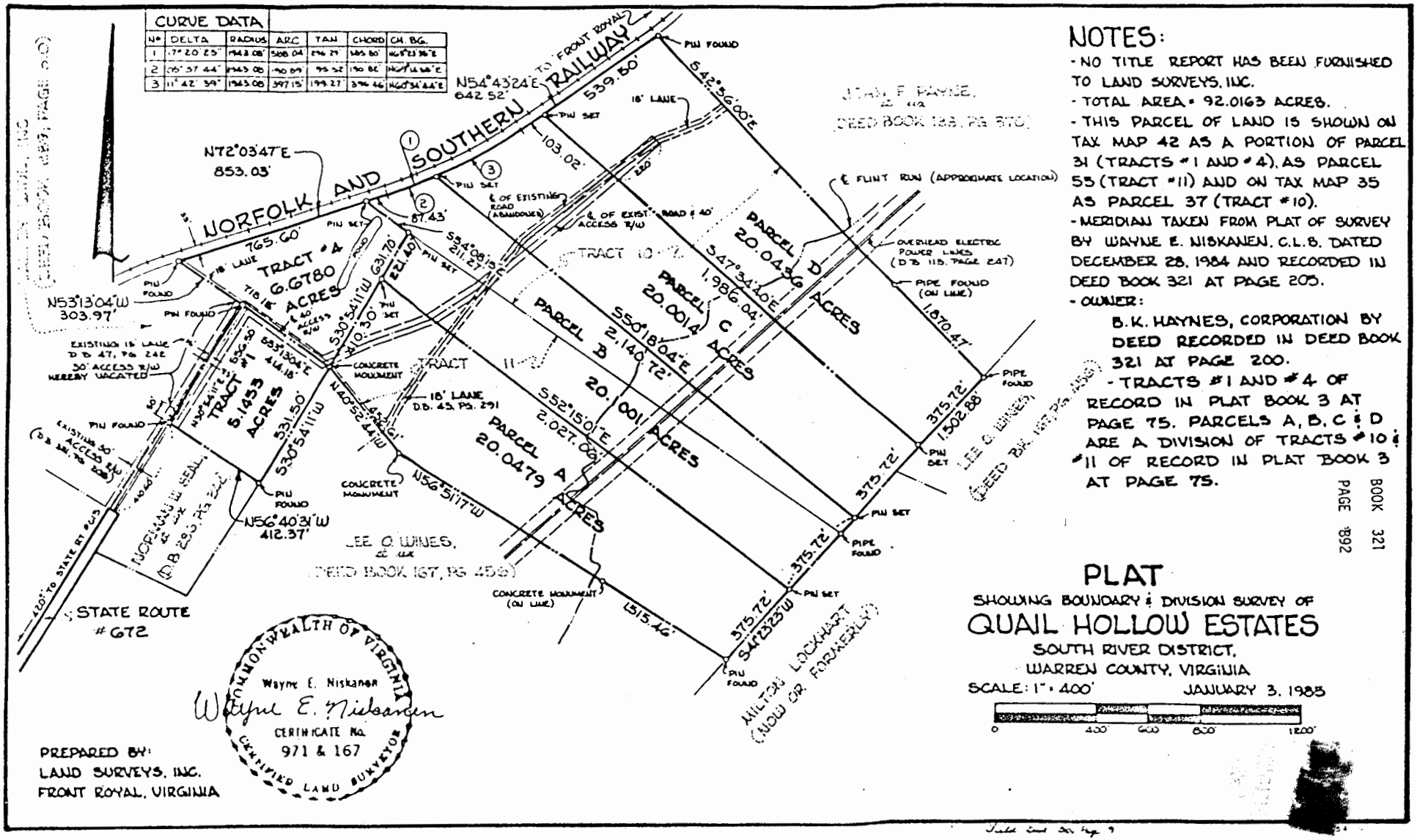
Call by: E H Georgi

Discussion:

Sought information re location & ownership of "TRACT 4" & QUAIL HOLLOW "ESTATES" as mentioned in file correspondence.

He found a recent plat showing the Subdivision and said he would send a copy.

Follow up required: NO.



CURVE DATA						
N°	DELTA	RADIUS	ARC	TAN	CHORD	CH. BG.
1	7° 20' 23"	1943.08'	508.04'	254.29'	506.80'	N61°23'36"E
2	05° 37' 44"	1943.08'	190.89'	95.52'	190.82'	N67°14'48"E
3	11° 42' 39"	1943.08'	397.15'	199.27'	396.46'	N67°34'44"E

NOTES:

- NO TITLE REPORT HAS BEEN FURNISHED TO LAND SURVEYS, INC.
- TOTAL AREA = 92.0163 ACRES.
- THIS PARCEL OF LAND IS SHOWN ON TAX MAP 42 AS A PORTION OF PARCEL 31 (TRACTS #1 AND #4), AS PARCEL 55 (TRACT #11) AND ON TAX MAP 35 AS PARCEL 37 (TRACT #10).
- MERIDIAN TAKEN FROM PLAT OF SURVEY BY WAYNE E. NISKANEN, C.L.S. DATED DECEMBER 28, 1984 AND RECORDED IN DEED BOOK 321 AT PAGE 205.
- OWNER:
  B.K. HAYNES, CORPORATION BY DEED RECORDED IN DEED BOOK 321 AT PAGE 200.
- TRACTS #1 AND #4 OF RECORD IN PLAT BOOK 3 AT PAGE 75. PARCELS A, B, C & D ARE A DIVISION OF TRACTS #10 & #11 OF RECORD IN PLAT BOOK 3 AT PAGE 75.

BOOK 321 PAGE 1892

PLAT

SHOWING BOUNDARY & DIVISION SURVEY OF

QUAIL HOLLOW ESTATES

SOUTH RIVER DISTRICT,
WARREN COUNTY, VIRGINIA

SCALE: 1" = 400' JANUARY 3, 1985

0 400' 600' 800' 1200'

PREPARED BY:
LAND SURVEYS, INC.
FRONT ROYAL, VIRGINIA

Virginia Department of Environmental Quality
PHONE LOG

ORIGINAL (Red)

Call to (from):	Of:	Phone: ( )
Gurwin Miller	Planning Comm Dist #7	703-634-4146
Site: Steuffer Chem VA-273	**Date:** 5/26/94	**Time:** 9:15 a.m.

Call by: E. D. Gillispie

Discussion:

Sought info on ave # persons/residence in Warren Co. Based on 1990 Census:

26142 warren Co. Population
411 # persons housed in group quarters
9879 occupied housing units.

$(26142 - 411)/9879 = 2.60$ persons/residence (ave)

Dist	Geographic & Demographics Data Files ① Pop	Σ	House Counts ②	Adjusted Pop	Σ
0-1/4	53	53	58	151	151
1/4-1/2	43	96	28	73	224
1/2-1	243	339	—	243	467
1-2	244	583	—	244	711
2-3	355	938	—	355	1066
3-4	478	1416	—	478	1544

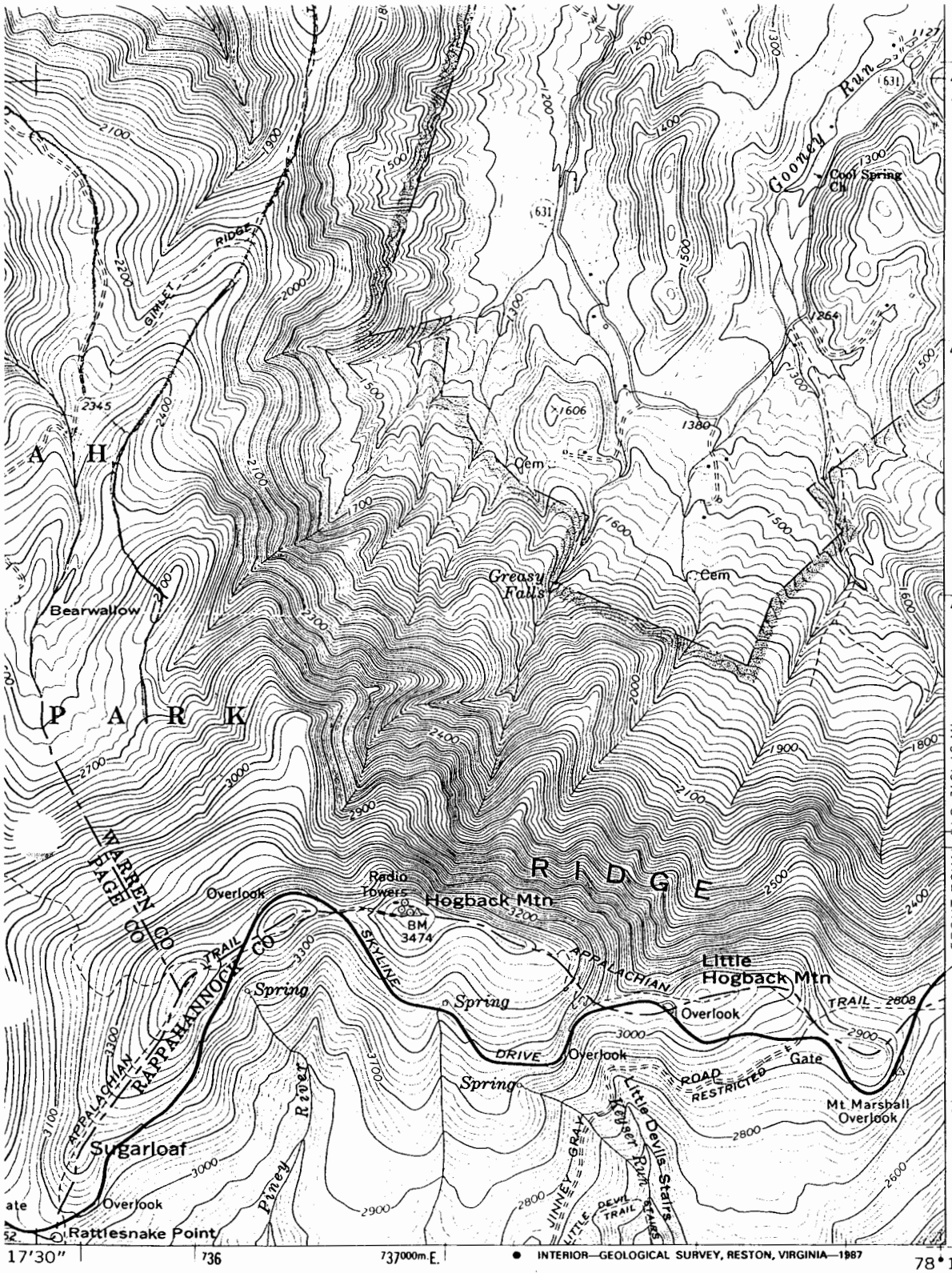
Follow up required: no

Notes ① 1990 U.S. Census Bureau Computer data bases

② 1966 (photo inspected 1972) plus 6 residences assumed on parcels cut off from site (Quail Hollow Est).

Appendix E

Reference 1

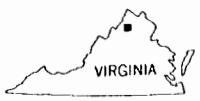


ROAD CLASSIFICATION

Heavy-duty ——— Light-duty .....

Medium-duty — — — Unimproved dirt .....

U.S. Route ( ) State Route



QUADRANGLE LOCATION

BENTONVILLE, VA.

SE/4 STRASBURG 15' QUADRANGLE

38078-G3-TF-024

1966

PHOTO INSPECTED 1972

DMA 5361 IV SE—SERIES V834

2

ISSN [redacted]

CLIMATOLOGICAL DATA
ANNUAL SUMMARY

VIRGINIA

1990

VOLUME 100 NUMBER 13

"I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA). IT IS COMPILED USING INFORMATION FROM WEATHER OBSERVING SITES SUPERVISED BY NOAA/NATIONAL WEATHER SERVICE AND RECEIVED AT THE NATIONAL CLIMATIC DATA CENTER (NCDC), ASHEVILLE, NORTH CAROLINA 28801."

Kenneth D Hadeen

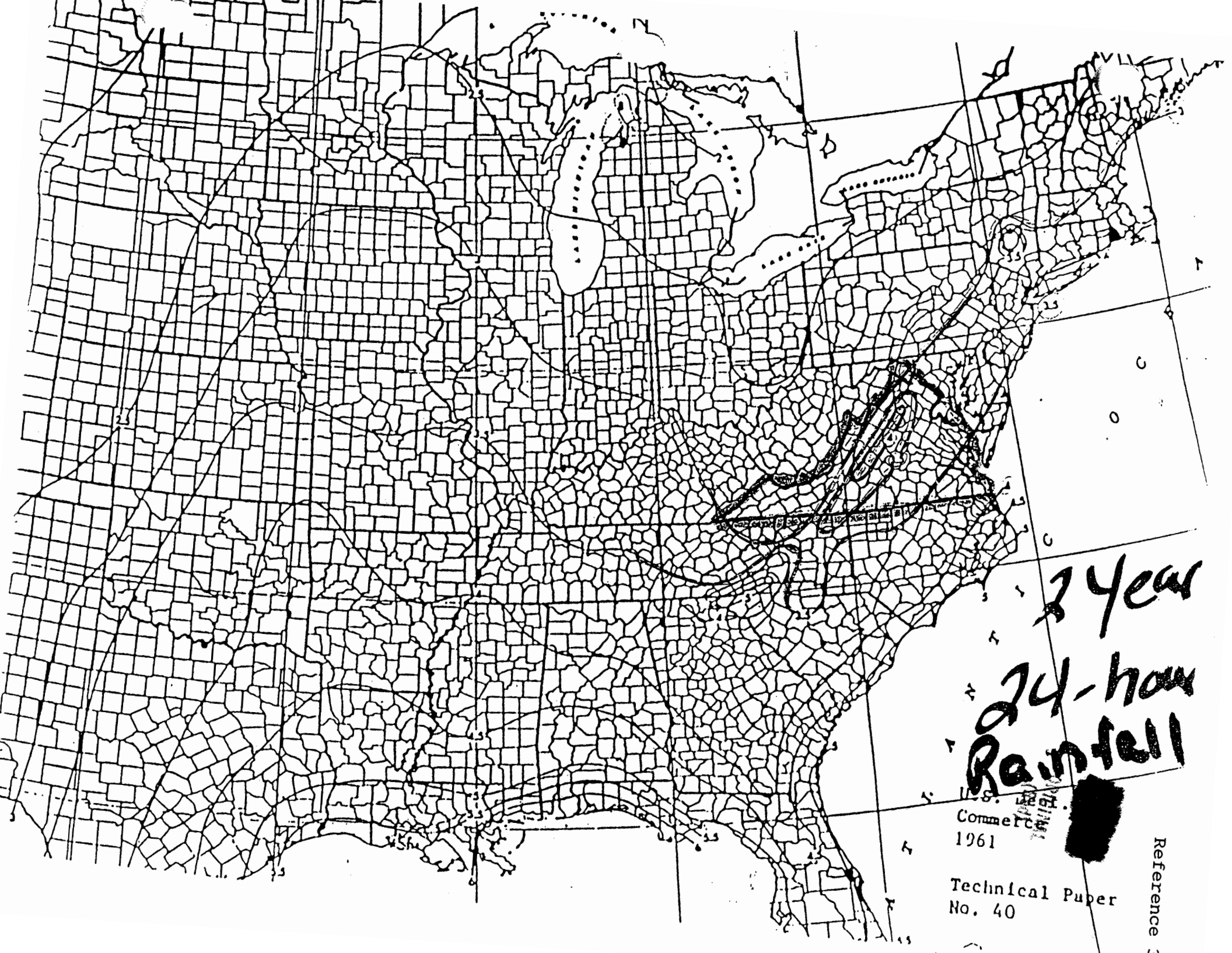
DIRECTOR
NATIONAL CLIMATIC DATA CENTER

noaa

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE

NATIONAL CLIMATIC DATA CENTER ASHEVILLE NORTH CAROLINA


2 year
24-hour
Rainfall
Commerce
1961
Technical Paper
No. 40
Reference

Reference 4

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION III
303 Methodist Bldg., 11th & Chapline Sts.
Wheeling, West Virginia 26003

DATE: 1/12/83

SUBJECT: Report on Potential Superfund Site - Stauffer Chemical @ Bentonville, VA.

FROM: Gary V. Bryant, Acting Chief GVB
Wheeling Field Section (3ES13)

TO: Eric Johnson, Remedial OSC
Air & Waste Management Division (3AW23)

The long awaited report is attached. We followed the suggested sampling protocol which called for drinking water metals on all liquid and soil samples. Soils were extracted using EP Toxicity procedures. All samples were analyzed for cyanides. Water samples were analyzed for organics using the GC/MS on a sample for volatiles, and on a sample for acid and base/neutral extracts. Soils were not tested for volatile organics since there is no standard procedure for that. Each sample was also tested for the drinking water chlorinated pesticides, plus PCB. Water samples were tested for 24 hour static bioassay. A quality control data summary is included with the Annapolis laboratory data. If you have questions on this information, please contact us. We would welcome the chance to do any followup field work, and will send you a copy of the aerial photo history of the site when we get it.

Attachments

cc: Joe Fromal, SWCB w/attachments
Jim Saunders, VA. Health "
Ed Lanford, Va. Health "
Bruce Smith (3ES30) "

EPA Form 1320-6 (Rev. 3-76)

United States
Environmental Protection
Agency

Environmental Monitoring
Systems Laboratory
P.O. Box 15027
Las Vegas NV 89114

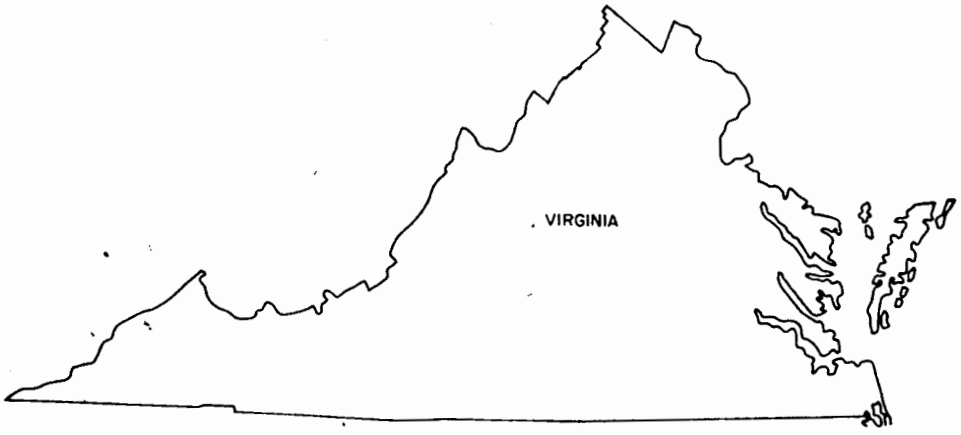
TS-PIC-83026
June 1983

Research and Development

EPA

Site Investigation Stauffer Chemical Plant Bentonville, Virginia

prepared for
EPA Region III
and OERR



R-585-7-5-24

SITE INSPECTION OF STAUFFER-BENTONVILLE SITE PREPARED UNDER

TDD NO. F3-8312-05
EPA NO. VA-273
CONTRACT NO. 68-01-6699

FOR THE

HAZARDOUS SITE CONTROL DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

OCTOBER 15, 1985

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY	REVIEWED BY	APPROVED BY
JAMES STRICKLAND	WILLIAM WENTWORTH	GARTH GLENN
ENVIRON. TECHNICIAN	ASSISTANT MANAGER	MANAGER, FIT III

R-585-7-6-35

A FIELD TRIP REPORT FOR STAUFFER-BENTONVILLE PREPARED UNDER

TDD NO. F3-8604-27
EPA NO. VA-273
CONTRACT NO. 68-01-6699

FOR THE

HAZARDOUS SITE CONTROL DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

AUGUST 11, 1986

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY	REVIEWED BY	APPROVED BY
AUDREY FLEISHER	THOMAS FROMM	GARTH GLENN
ENVIRON. TECHNICIAN	ASSISTANT MANAGER	MANAGER, FIT III

January 30, 1987
R-585-1-7-23
68-01-7346

Mr. Harold Byer
U.S. Environmental Protection Agency
841 Chestnut Building
Ninth and Chestnut Streets
Philadelphia, PA 19107

Subject: Draft Toxicological Assessment Report
TDD No. F3-8612-101
Stauffer-Bentonville Site
Bentonville, Virginia

Dear Mr. Byer:

Submitted herewith is a draft Toxicological Evaluation for the subject site. FIT 3 was tasked to perform a toxicological assessment of resampling data submitted in a field trip report under TDD No. F3-8604527/F3-8612-100. Based on our review of the available data and information, we have concluded that EPA should consider the following:

- A closure plan should be developed and implemented at the site. The plan should require the draining of the two ponds located in the northern portion of the site.
- A groundwater and surface water monitoring program, including pH measurements, should be included as part of the site closure.

If you have any questions, please contact me.

Respectfully submitted,

Elizabeth Quinn
Toxicologist

Reviewed and approved by,

Garth Glenn
Reg. Operations
Manager, FIT 3

EQ/rmk